

WHAT IS CLAIMED IS:

1. A fluidized catalytic cracking process for cracking a heavy hydrocarbon feed,  
the process comprising:

- 5 a) contacting the heavy hydrocarbon feed with a cracking catalyst to produce a  
light hydrocarbon product and a spent catalyst having coke deposited thereon;
- b) regenerating the spent catalyst in a catalyst regenerator by contacting the spent  
catalyst with air to burn the coke and provide a regenerated catalyst and a flue  
gas;
- 10 c) separating the regenerated catalyst from the flue gas using a first stage and a  
second stage separator located within the catalyst regenerator to yield a  
catalyst fines-contaminated flue gas stream;
- d) recycling the regenerated catalyst to the cracking reactor for further production  
of the light hydrocarbon product; and
- 15 e) purifying the catalyst fines-contaminated flue gas stream in a third stage  
separator apparatus having an upper and a lower tube sheet contained therein  
and a plurality of cyclones between the upper and lower tube sheets, each  
cyclone comprising:
  - 20 i) a substantially vertical cyclone body having a closed bottom end and a top  
end fixed with respect to the upper tube sheet, the cyclone body defining a  
gas inlet at its top end for receiving a portion of the catalyst fines-  
contaminated flue gas stream from above the upper tube sheet and a



sidewall of the cyclone body defining a plurality of discharge openings between the upper and the lower tube sheets for tangentially discharging particles and a minor amount of an underflow gas stream;

ii) one or more swirl vanes located proximate the gas inlet to induce centripetal acceleration of the catalyst fines-contaminated flue gas stream; and

iii) a gas outlet tube located centrally within the cyclone body, extending through the closed bottom, and further extending through the lower tube sheet, the gas outlet tube defining a clean gas inlet for receiving a purified gas stream from within the cyclone body and further defining a clean gas outlet located below the lower tube sheet for discharging the purified gas stream.

2. The process of claim 1 where the purified gas stream has a concentration of particles of 5 microns or greater that is less than about 50% of the concentration of particles of 5 microns or greater in the catalyst fines-contaminated flue gas stream.

3. The process of claim 1 where the minor amount of the underflow gas stream is less than about 10% of the catalyst-fines contaminated flue gas stream.